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Engineering Note

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Project: MINOS DC Power Supplies
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Subject: Minder Crate Power Supply Wiring Harness

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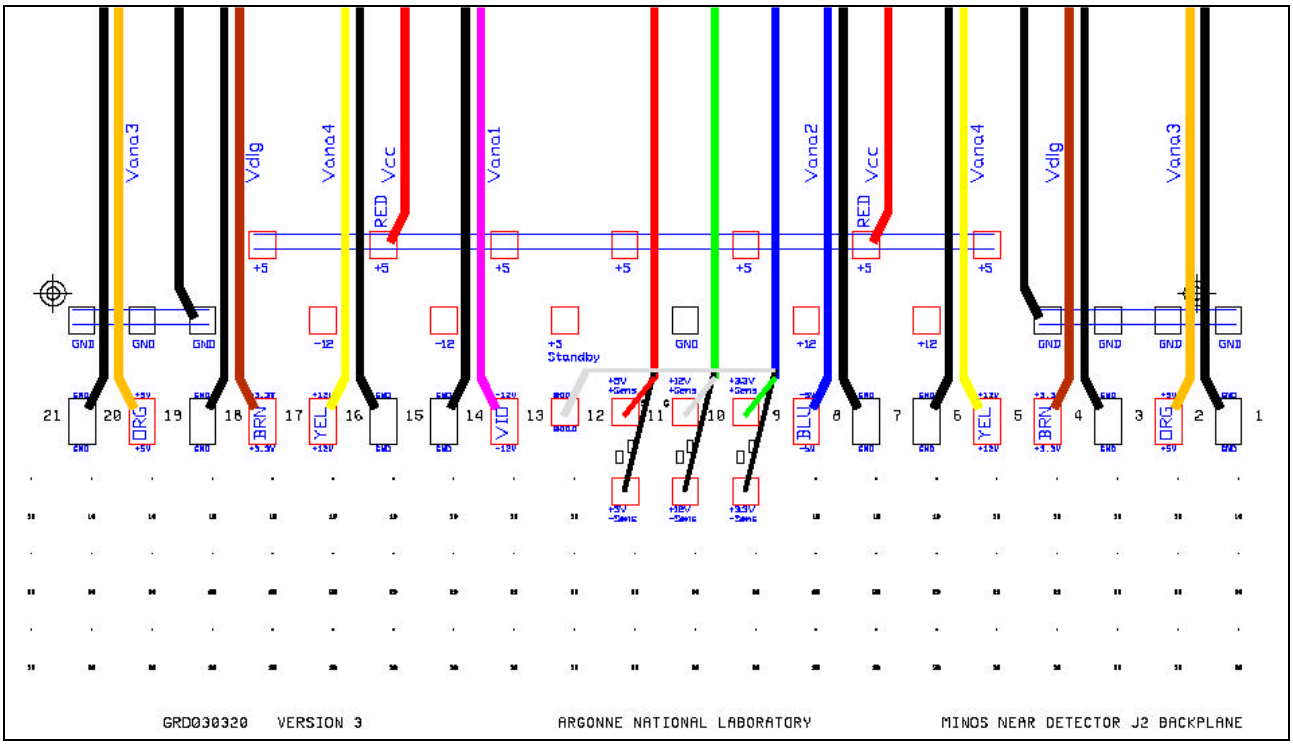
1.1. The issues concerning the Minder Crate power harness divide into two areas. Mechanical and Electrical

1.1.1. Mechanical – plumbing and airflow ducting obstruct the route between the power supply and the crate. The harness must also weave between the card guides in order to reach the back plane connection points. Some positioning and or support mechanism will be needed to immobilize the harness.

1.1.2. Electrical – The power supply is capable of delivering much higher currents than the back plane connectors can safely handle. Additionally the power connection points can only accommodate a number 6 screw size. This along with the spacing dictates the maximum wire gauge that can be used in the harness. Three of the current requirements of the crate exceed the capability of one power connector so two connector will be needed for each of these rails. This requires fusing each conductor of each power connection point at its rating.

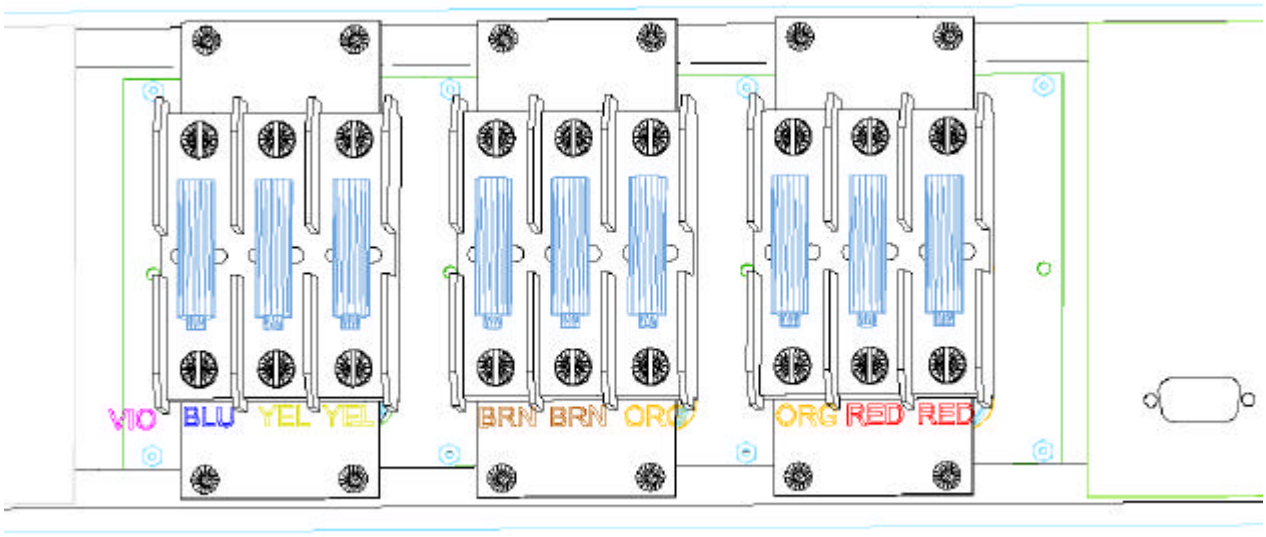
2. Minder Crate Backplane

2.1. Rear View of Backplane showing the power rail connections. There is remote sensing only on the three high current rails. The backplane has polyfuses on each sensing connection to limit current to a safe level.



3. Wiener Power Supply Connections

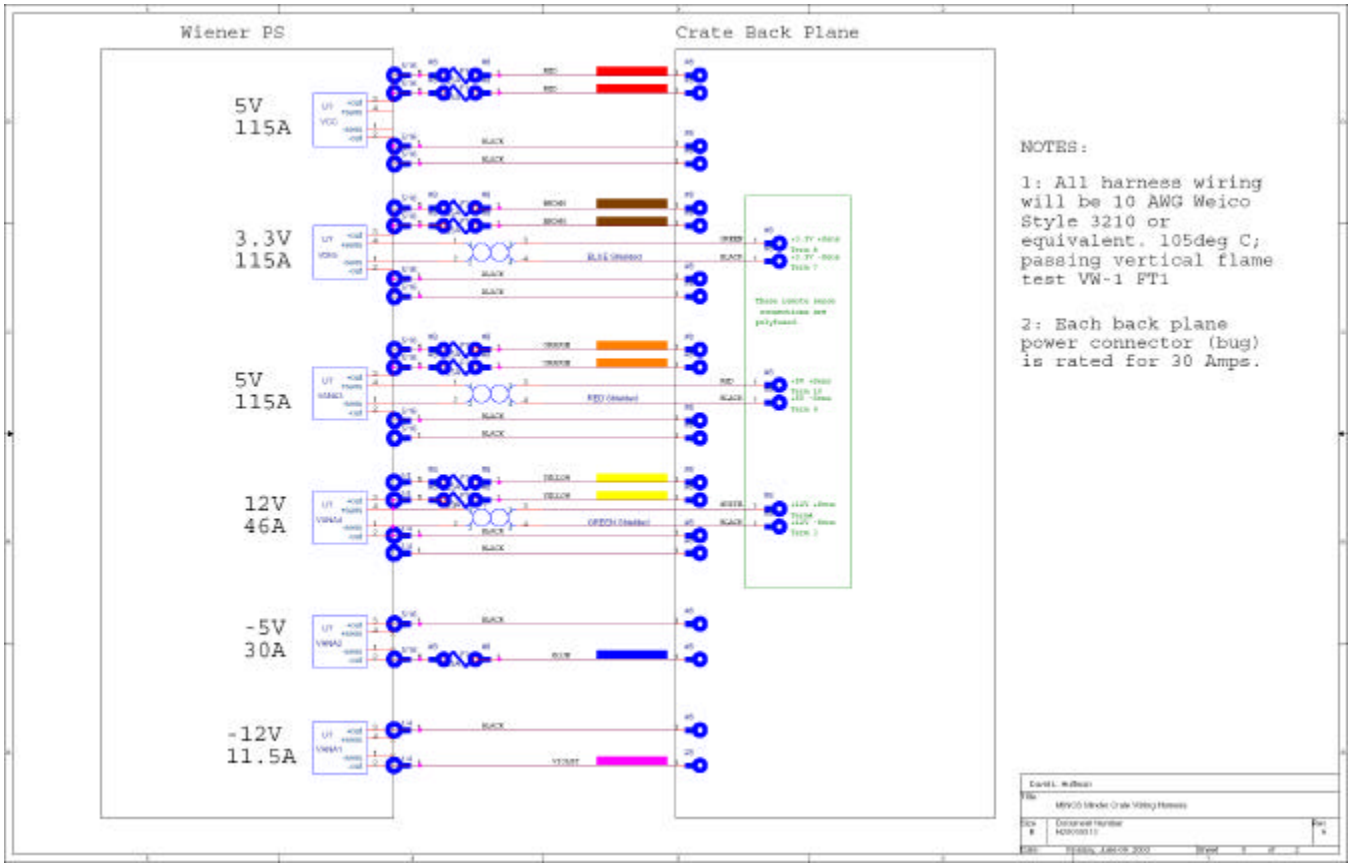
3.1. Rear View of the Wiener Power Supply showing the fused connections. There is a cover over this area to prevent accidental contact with the AC input or the DC output terminals. The harness will not be allowed to contact any sharp conductive edges along its path from the supply to the crate.



3.2. This is the output configuration of the power supply terminals.

4. Wiring Diagram

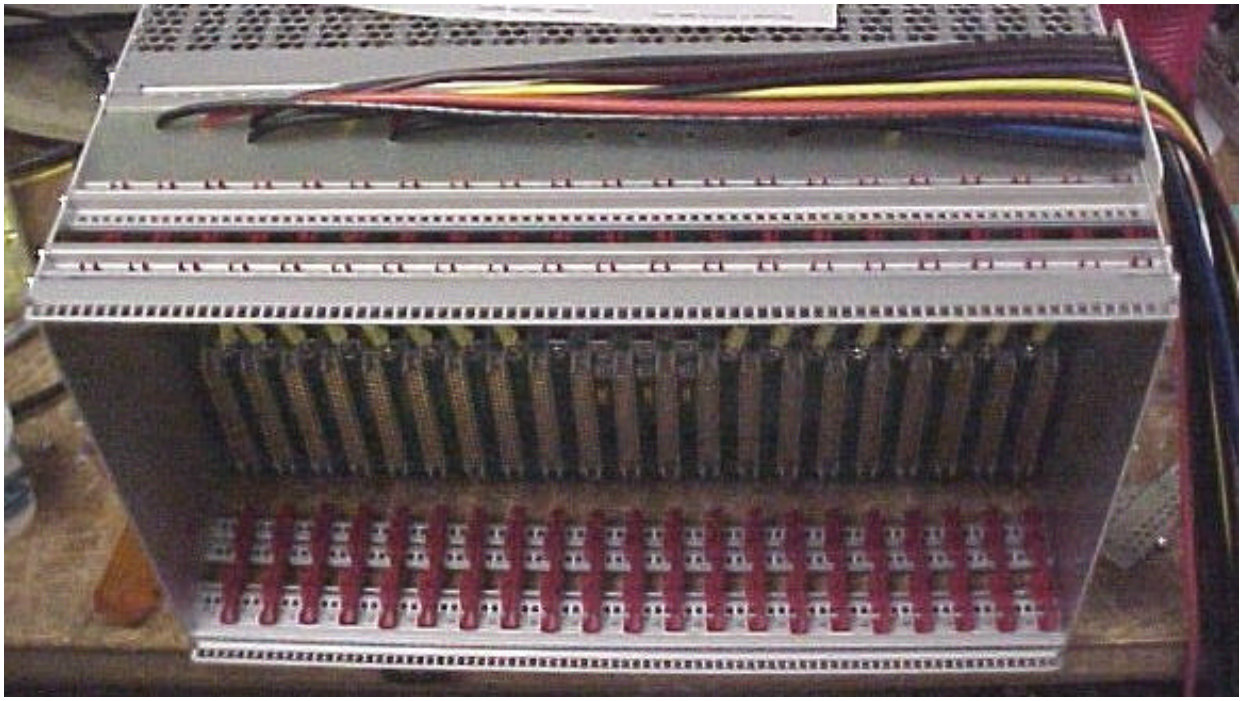
4.1. NEC table 310-16 allows 10 AWG to handle 40Amps with a temperture rating of 90°C. From NEC table 310-15(b)(2)(a) this level is adjusted to 70% (28Amps) for 7-9 conductors in a group. Grouping the harness in three bundles will be done to meet this criteria. We will bundle the V_{CC} conductors with V_{AN1}, V_{DIG} with V_{AN2} and V_{AN3} with V_{AN4}. This will keep the ampacity at 28Amps which is above the fuse rating of 25Amps.



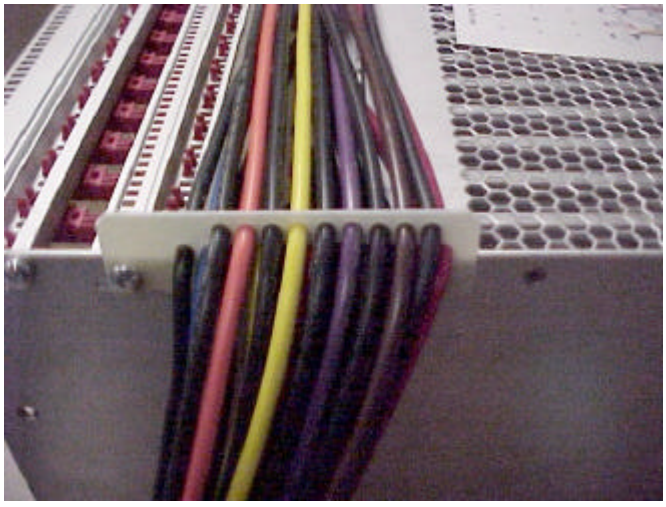
5. The Crate Wiring

5.1. The wiring must enter the crate from the top and hug the backplane as it makes its way to the terminal connections. To facilitate this routing there are two G-10 pieces used to direct the wiring.

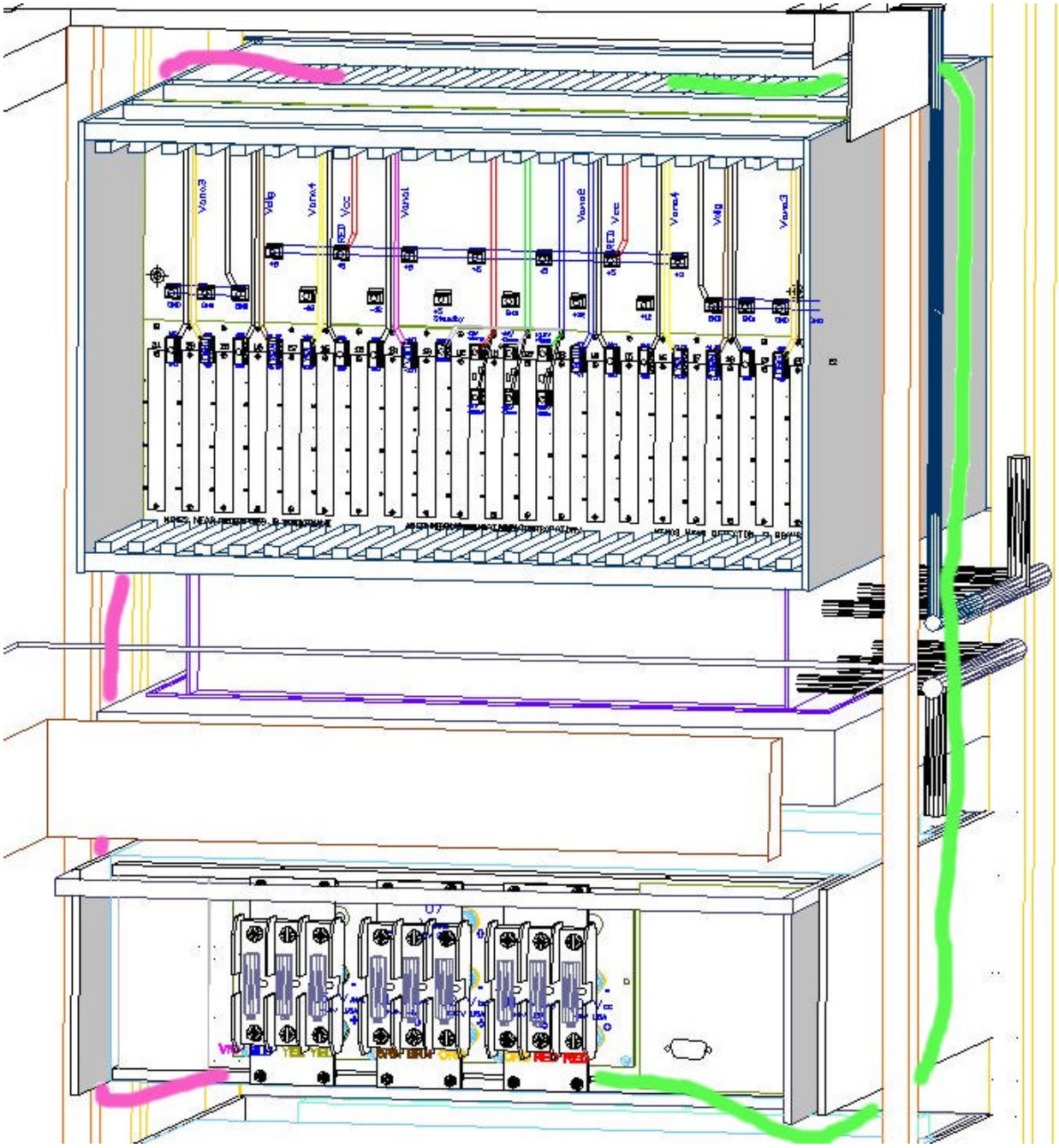
5.2. The top of the crate has a spacer that positions each wire between the AUX cards and holds them next to the backplane.



5.3. The second G-10 piece acts as a comb to spread the wires and position them close to the top of the crate.



6. Front End Relay Rack Layout



Harness wiring will follow the right or left route depending on the rack it occupies. The wires leave the MINDER crate from the top and enter the power supply from the bottom.

7. Bill Of Materials

Item	Quantity	Part	Description	Unit Cost	Sub Total Cost
			Wiring		
1	38	1110-427000	10 AWG #8 Ring Tongue Terminal	$ 0.14	$ 5.32
2	14	1110-428500	10 AWG 5/16" Ring Tongue Terminal	$ 0.16	$ 2.20
3	6	1110-428000	10 AWG 1/4" Ring Tongue Terminal	$ 0.17	$ 1.00
4	7		26 AWG #8 Ring Tongue Terminal	$ 0.23	$ 1.61
5	1	Custom	Crate Wire Spacer	$ 4.00	$ 4.00
6	1	Custom	Crate Wire Comb	$ 4.00	$ 4.00
7	10	3210	Weico Wire 10AWG Brown	$ 0.16	$ 1.60
8	10	3210	Weico Wire 10AWG Red	$ 0.16	$ 1.60
9	10	3210	Weico Wire 10AWG Orange	$ 0.16	$ 1.60
10	10	3210	Weico Wire 10AWG Yellow	$ 0.16	$ 1.60
11	5	3210	Weico Wire 10AWG Blue	$ 0.16	$ 0.80
12	5	3210	Weico Wire 10AWG Violet	$ 0.16	$ 0.80
13	50	3210	Weico Wire 10AWG Black	$ 0.16	$ 8.00
14	6		26 AWG wire sleeve OPTIONAL	$ 0.23	$ 1.38
15	3		10 AWG wire sleeves OPTIONAL	$ 0.05	$ 0.15
			DC Fusing		
16	3	Custom	Fuse Holder Mounting Plate	$ 4.00	$ 12.00
17	3	6M30A3SPQ	Marathon 3 pole 30Amp fuse holder	$ 6.19	$ 18.57
18	9	BLF025	25 Amp Cartrage Fuse	$ 1.89	$ 17.01
19	12	1450-215000	Pillar Spacer 3/4" long unthreaded	$ 0.29	$ 3.48
20	6	1226-160500	8-32 x 1/4" Binder Head screw	$ 0.01	$ 0.06
21	12	1226-389000	4mm x 30mm flat sockethead screw	$ 0.09	$ 1.08
			AC Fusing		
22	6	1210-111000	8-32 Nut with captured star washer	$ 0.02	$ 0.12
23	1	Custom	AC Line Cord Strain Relief	$ 4.00	$ 4.00
24	1	1120-106000	15 Amp Medium Lag Fuse 250V	$ 0.73	$ 0.73
			Protective Cover		
25	1	Custom	Protective Cover, Polycarbonate	$ 10.00	$ 10.00
26	2	0965A2PG3X10	3mm x 10mm flat head screw 18-8 SS	$ 0.03	$ 0.06
					$ 102.77
				44 crates	$ 4,521.88